

## Summary of TPC mechanics meeting, Aug. 3, 2010

Attendees: Bo Yu, Craig Thorn, Joe Howell, Walt Fox, Bruce Baller, Hans Jostlein,

Carl Bromberg, Russ Rucinski

1. There will be 7 independent, continuous stainless steel rails. One rail for each APA and CPA row. We will not have cross members above the rails. The rail supports are every 5 meters along each row. Joe Howell is going to size and cost the rails and support rods. Russ will add the cost of the extra ports to the cryostat WBS.
2. Installation sequence needs to be looked out. Could complete one CPA row of 28, then move on to next APA row of 28 and so forth for seven rows. Alternatively, complete a column of CPA, APA, CPA, APA... CPA test then move on to next. There are schedule implications with serial installation. Block in installed panels. Joe Howell to estimate installation times.
3. Rolling cart scaffolding tower is a likely solution for working at height. A scaffolding tower could have the fold down ladder feature. Could use some advice from a custom scaffolding company.
4. Rails are stainless steel and are continuous for 70 meters. Vertical supports are installed biased for warm condition. The bias goes from 4.5 cm off-center at ends to on-center at mid length of rail and back to 4.5 cm off-center at other end. When rail shrinks a total of 18 cm in the cold condition, the ends move inward 9 cm and the rods are 4.5 cm off-center again.
5. Cable ducts are located on each side of the top APA's corners. Bottom APA's have 14 meter longer wiring and fibers than the top APA's. The bottom APA is lowered into the cryostat. The fibers and wiring from the lower panel is pulled up through the vertical frame side tube of the top APA. The two high APA then has short pig tails of fibers and cables that then connect to bundles that are overhead. This is preferred over having long spools of wiring and fibers that hang down from overhead that could bump into wire planes and damage wires.
6. Testing time + hook up once the APA is rolled into place is estimated to be 2 persons x 1 hour x 200% contingency = 2 persons x 2 hours.
7. Signal feed through ports are spaced every 5 meters along each row.
8. G-10 rods span across at the top and bottom between APA and CPA frames to support a Kapton field cage. The Kapton field cage is unrolled as you go along. At the far end and hatch end, the Kapton field cage will run vertically down. Some extra G-10 rods may be between the APC and CPA every 2-3 m for those ends. The Kapton field cage was described as a 2 to 3 foot wide roll that is 250 feet long.
9. Attach adjacent panels with pins.
10. The rods that support the rails will have adjustable length and be biased for the warm/cold position. The rods and rails will be installed by the cryostat installation contractor at the same time as the roof panels are done. The rails can be surveyed level. The rods going from the APAs and CPAs to the trolleys that ride on the rails are adjustable in length so that the frames can be set true and square. The rods from the CPA's are G10 because the CPA frames are at 125kV.
11. The pumps will be moved to the end opposite the hatch to allow for clearance of moving the APA's and CPA's into rows. And also for clearance for turning or moving the rolling scaffolding tower. Bringing the pumps to the far end places them adjacent to the cryogenic equipment end

of the cavern. Piping outside the cryostat gets shorter. The returning liquid argon enters the cryostat at the same end and then the pipe inside distributes the flow along the cryostat length. We are keeping the 0.5 m gap at the opposite hatch end, and placing pumps between APA/CPA rows but beyond the vertical field cage. We will not ask ARUP to change their current arrangement as they are finishing up the conceptual report and it will not impact the design, cost or schedule.

12. Bruce is to update the parameters spreadsheet to include the thicknesses of the G10 strips that run along the outside of the 2.5 m x 7 m frames.